Flow Line Controls
Series 55 PPR Pneumatic Positioner
Installation & Operation Manual

Flow Line Controls, Inc.
P.O. Box 677 · Schriever, LA 70395 · Phone: 985-414-6003 · Toll Free 1-800-815-9226 ·Fax 985-414-6072
www.flowlinecontrols.com

Doc. No. FLCIOM55 © 2009 Flow Line

Description of Device

Pneumatic-pneumatic rotary positioner (3~15psi) is an advanced control device for a rotary control valve that provides unparalleled stability in difficult environments.

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 spilt range available
- Rugged aluminum housing with corrosion-resistant coating
- Extremely vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included

Part Number System

PPR – [Input Signal] [Feedback Lever Type] [Pressure Gauge (SUP. OUT)] [Pilot Valve Orifice] [Mounting Bracket]

Description	Code
Input Signal:	
3~15psi	1
Feedback Lever:	
	A: M6 X 40L (standard)
	B: M8 X 40L
	C: M6 X 60L
	D: M8 X 60L
	N: Namur shaft (direct mounting)
Pressure Gauge:	
	0: 2bar (30psi)
	1: 4bar (60psi)
	2: 6bar (80psi)
	3: 10bar (150psi)

Description	Code
Pilot Valve Orifice:	
	S: standard actuator (actuator volume over 180 ㎤)
	M: small actuator (actuator volume 90~180 ㎤)
Mounting Bracket:	
1~3: for Namur shaft type	N: none
4~5: for fork lever type	1: 80x30x20 (H)
	2: 80x30x30 (H)
	3. 130x30x30 (H)
	4: DHCT bracket (80x30)
	5: box bracket 130x30

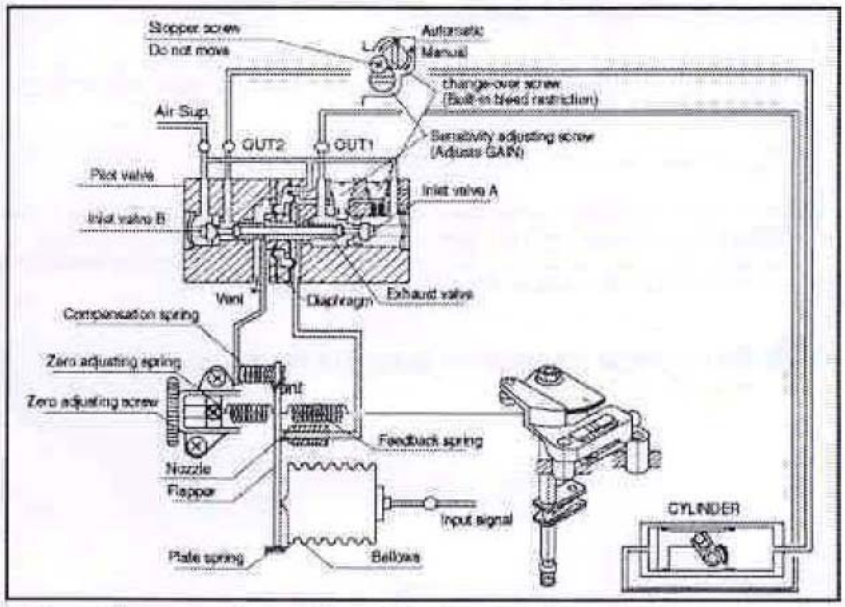
Specification

	PPR	
	Rotary Type (Cam Feedback)	
	Single	Double
Input Signal	0.2~1.0 kgf/㎠ (3~15psi) (Note. 1)	
Air Supply Pressure	Max. 7.0 kgf/㎠ (100psi)	
Standard Stroke	60 ° ~ 100° (Note. 2)	
Air Piping Connection	PT 1/4 (NPT 1/4)	
Ambient Temperature	-20 ~ 70℃	
Pressure Gauge	Stainless Steel	
Output Characteristics	Linear	
Linearity	Within ± 1.5 % F.S	
Sensitivity	Within 0.5 % F.S	
Hysteresis	Within 1.0% F.S	
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/㎠)	
Flow Capacity	80 LPM (Sup. 1.4 kgf/㎠)	
Material	Aluminum Die Casting Body	
Weight	2.1 kg	

Note: 1) 1/2 split range can be adjusted
2) Stroke can be adjusted to 0 ° ~ 60° or 0 ° ~ 100°

Principle of Operation

As the input signal (3~15psi) from the controller increases, the plate spring of the bellows works as a pivot. As the flapper receives the rotary torque in the counter-clockwise direction, the clearance between the nozzle and the flapper will increase, and the back pressure of the nozzle will decrease. As a result, the exhaust valve of the pilot valve moves to the right, and the output pressure of OUT1 increases (as OUT 2 decreases) to move the cylinder actuator.



The movement of the actuator in turn rotates the feedback shaft, and the feedback spring lengthens or shortens by the movement of the feedback cam connected to the feedback shaft. The actuator stays in the position where the spring force is balanced with the force generated by the input signal in the bellows. The compensation spring is for direct feedback of the motion of the exhaust valve and is connected to the flapper to enhance the stability of the loop. The zero point is adjusted by changing the zero adjustment spring tension.

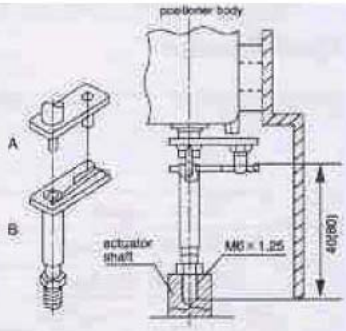
Mounting the Positioner and Attaching the Feedback Lever

- Standard Mounting (Fork Lever Type)

① Mount the bracket to the actuator. The brackets have been designed for actuators with the 80 X 30mm NAMUR accessory pattern. For the 130 X 30mm pattern, the block type bracket is available.

DHCT Bracket (80 X 30)

Block Type Bracket (130 X 30)



Standard Mounting (Fork Lever Type)

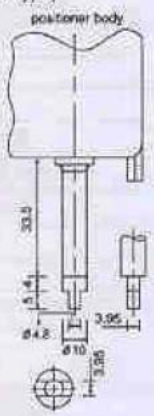
② Mount the fork lever "B" to the actuator and thread it into the actuator first before mounting the positioner and the bracket to the actuator.

③ Once the bracket has been mounted to the actuator, mount the positioner to the bracket with the bolts (2-M8 or 3-M8). Be sure that the feedback lever (feedback lever shaft "A" + fork lever "B") is in perfect alignment with a rotary actuator output shaft. The spring pin of the feedback lever shaft "A" acts as a guide and should be placed in the orifice of the fork lever "B". Please note that linearity and hysteresis will suffer if these alignment and placement are not correct.

- Direct Mounting (NAMUR Type, see the right picture)

NAMUR Type Bracket (80 X 30 X 20)

NAMUR Type Bracket (130 X 30 X 30)



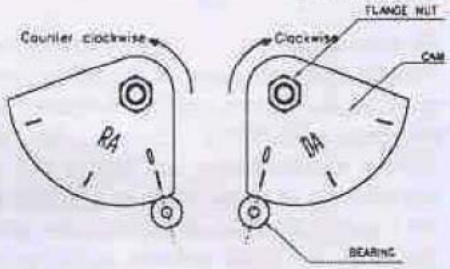
Direct Mounting (NAMUR Type)

Cam and Indicator Adjustment

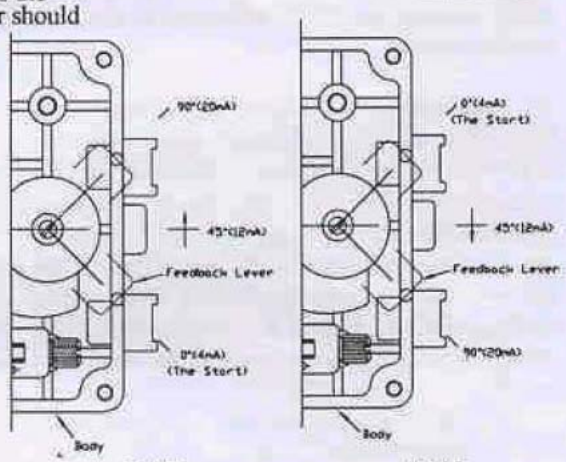
① Loosen the flange nut on the cam. Match the part of the cam with "0" marked on it with the center of bearing as shown to the right. The span adjusting arm unit should now be aligned.

② Tighten the flange nut of the cam after setting the cam.

③ After cam installation, proceed to adjust zero and span. Once this is complete, secure the indicator with the bolt (M6) to the feedback shaft according to the actuator type (RA or DA) as shown below. The position for the indicator should be arranged in the scale (0-90 degrees) shown on the cover.



⚠ Be sure that RA (reverse acting) is the standard factory setting.



[RA] [DA]

Span and Zero Adjustment

① Check all air connections. See the picture below on this page.

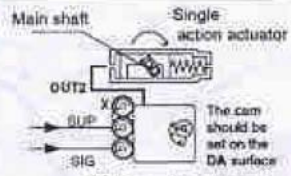
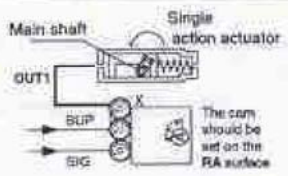
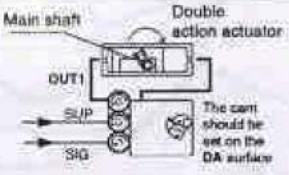
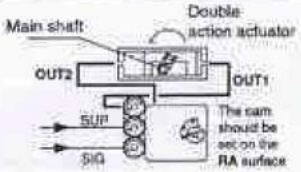
② Set input signal to 3psi while positioner is at the 0% or stroke starting point. Turn the zero adjustment knob clockwise or counter clockwise to set the zero position.

③ Check the stroke of actuator by setting the signal to 15psi. If the stroke does not meet 100%, turn the span adjustment screw clockwise or counter clockwise until 100% is reached.

④ Set input signal back to 3psi and adjust the zero adjustment screw until starting point is reached.

⑤ Repeat the process until the desired set point is reached.

Air Connections

Direct Acting (DA)		Reverse Acting (RA)	
As input signal increases, Actuator stem rotates clockwise	 OUT1 must be plugged	As input signal increases, Actuator stem rotates counter-clockwise	 OUT2 must be plugged
As input signal increases, Actuator stem rotates clockwise		As input signal increases, Actuator stem rotates counter-clockwise	

Pilot Valve Seat Adjuster

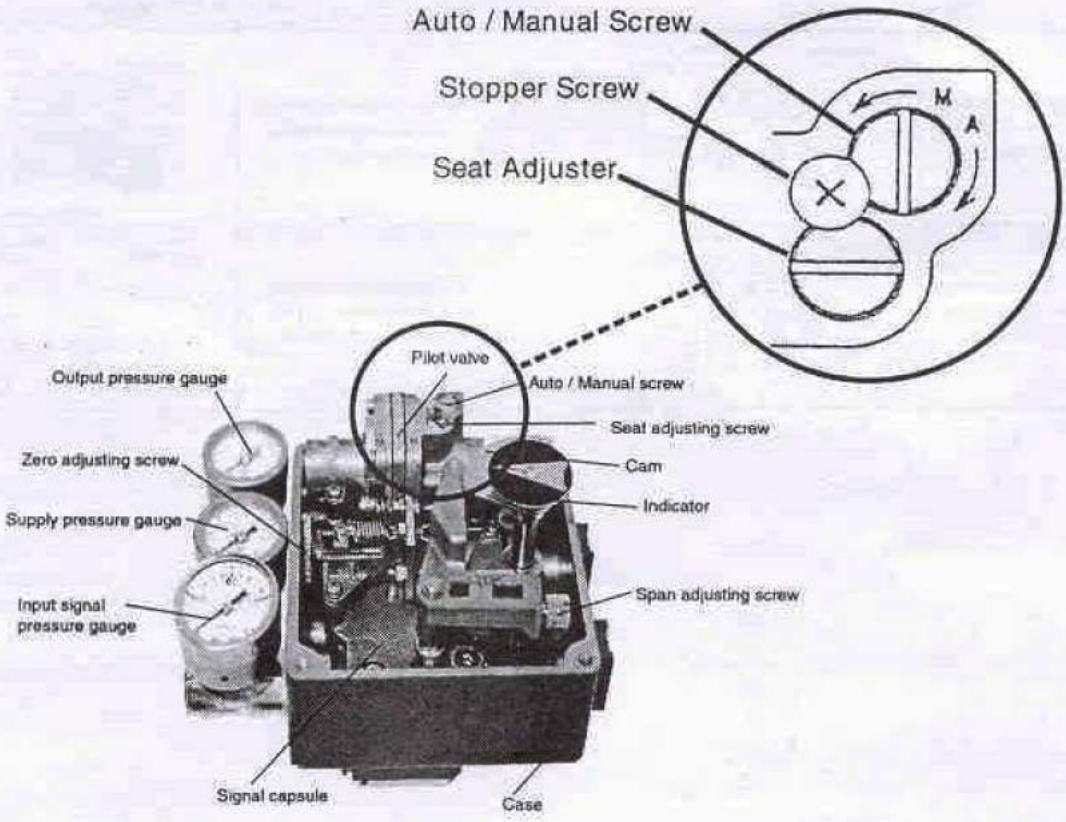
The seat adjuster (sensitivity adjusting screw) located on the pilot valve is used to adjust sensitivity the positioner for double-acting actuators. Normally, no adjustment is required.

When the sensitivity is not optimal, rotate this screw clockwise. If there is hunting, rotate the screw counterclockwise. For smaller actuators, it might be necessary to insert the small pilot valve orifice inserts if adjusting the seat does not improve performance. Note that when the seat is needed to be adjusted, make it from min. 1/4 turn to max. 1 turn.

Auto / Manual Operation

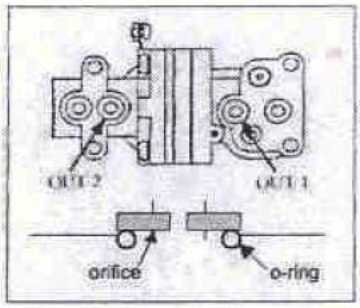
For manual operation using an external air regulator, turn the Auto / Manual screw located on the pilot valve in the direction of M. This will bypass the 3-15psi input signal.

Internal View



Optional Restricted Pilot Valve Orifice

WARNING: Before removing pilot valve, be sure to disconnect the positioner from the signal and compressed air source.



For improved control using smaller actuators, a restricted pilot valve orifice kit is included with the positioner. To install, the pilot valve must be removed from the positioner. Remove the four screws holding the pilot valve to the positioner body. As you remove the pilot valve, be sure to hold the compensation spring (see page 2) in place. Flip the valve so the bottom faces you. Remove the o-rings from the *out 1* and *out 2* ports (as shown in the diagram at right). Place the orifice plates in their place with new o-rings above them, and re-install the pilot valve, making sure the compensation spring is back in place. The positioner is now set up for smaller actuators.

Troubleshooting Tips

Hunting

* If your actuator is small, install orifice restrictions in ports 1 and 2 of the pilot valve. Then the control valve moves slow.
* The nozzle might be clogged. Take the metal wire located in the positioner cover and clean the nozzle.

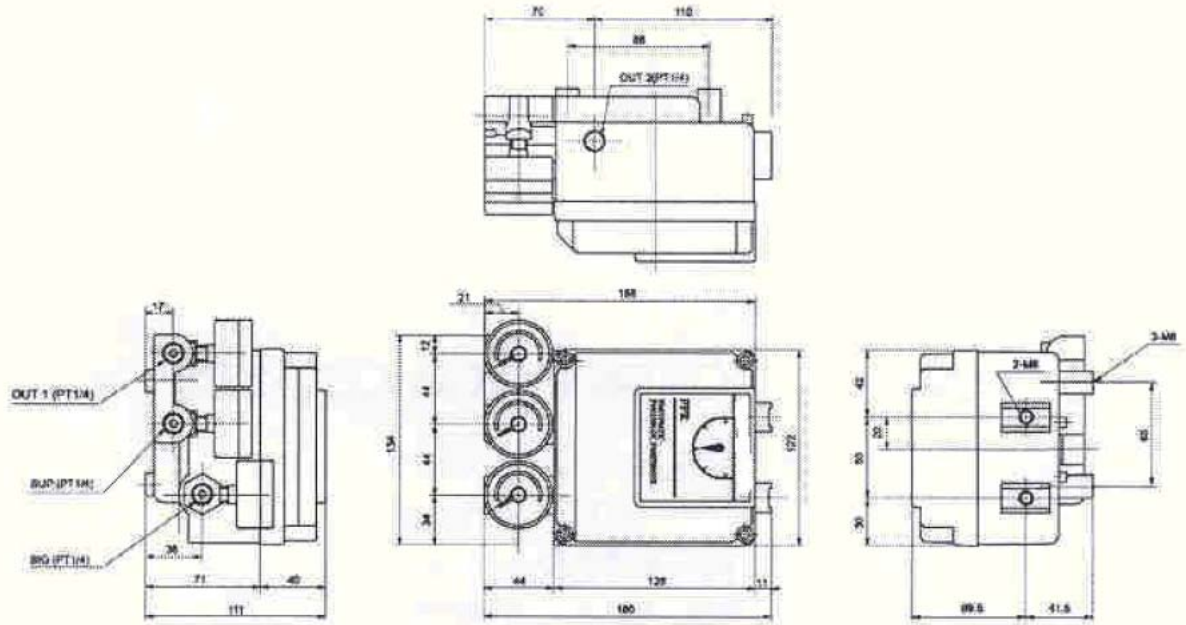
Poor Linearity

* Air supply might be unstable- check or install a pressure regulator.
* Check Zero and Span adjustments
* Loose feedback lever – tighten feedback lever

Poor Hysteresis

* Loose mounting of the actuator to the positioner – tighten the mounting bracket.
* Adjust the seat, using the seat adjuster (double acting actuators only)

Dimensions



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Flow Line Controls Positioner Specifications

Series 55 3-15 psi Pneumatic
Series 56 4-20 mA Electro-Pneumatic

Series 55

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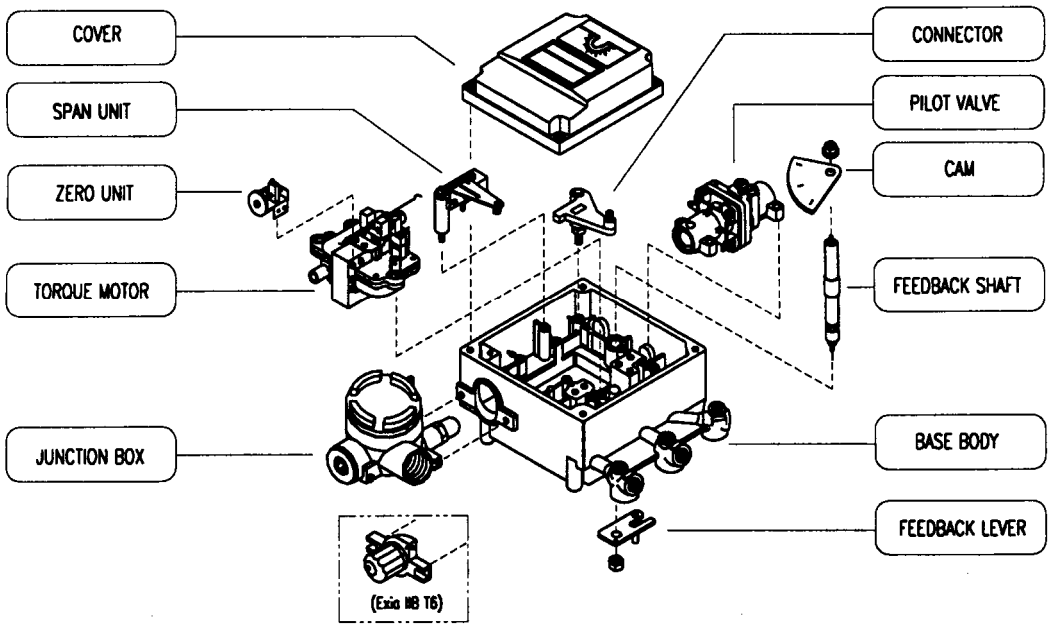
Series 56 4-20 mA Electro-Pneumatic Positioner

Flow Line Controls Series 56 Electro-Pneumatic positioners utilizes industry proven technology to simplify its design. Featuring an Electro-magnetic I to P transducer capable of 4-20 mADC inputs without the use of microchip and micro-magnets in the circuitry that many competitors use. Therefore giving Flow Line Series 56 positioners a long and trouble free service life in the harshest and most critical of environments.



The input of a 4-20 Ma DC signal flows through an electric magnetic coil located in the magnetic field of a large permanent magnet.

The current variation of the 4-20 mADC signal varies the flux of the permanent magnet thus creating movement of the flapper in relation to the nozzle without any microchip circuitry.

The movement of the flapper (which is held in place by the plate spring acting as a pivot) then increases the distance in-between the flapper and the nozzle. The resulting changes in back pressure in the nozzle assembly causes the globe valves in the pilot valve assembly to shift position simultaneously.

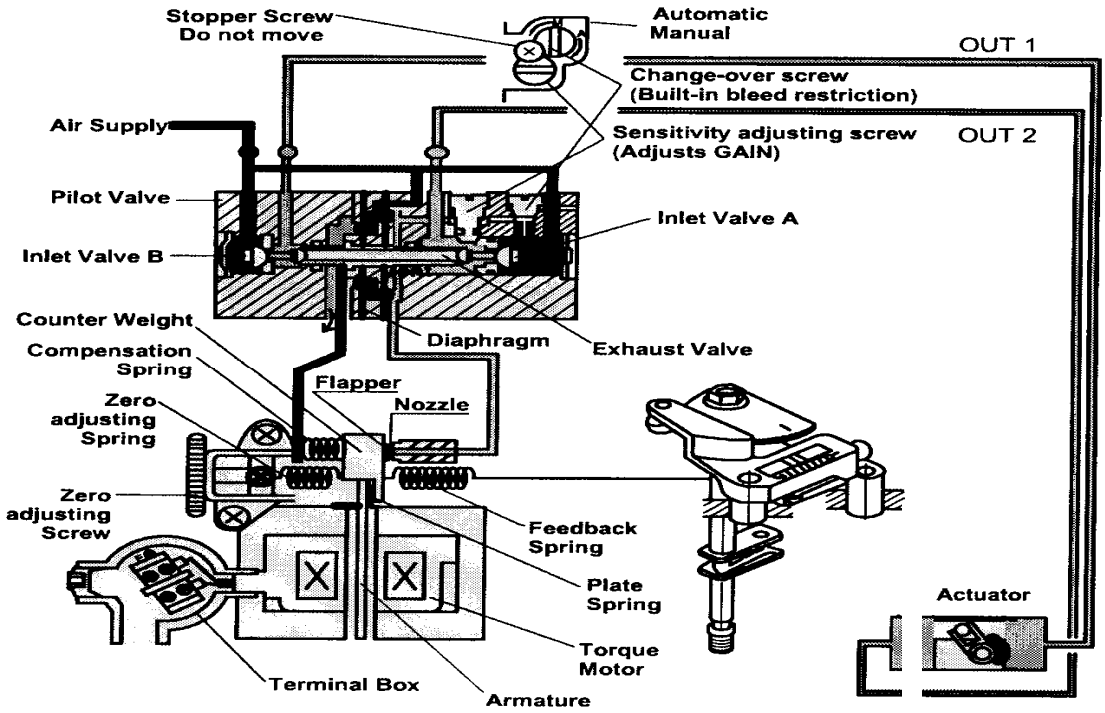
The result being line 1 Output to the actuator has an (increase in air pressure filling the actuator cylinder), and line 2 Output has a (decrease in air pressure draining air from the opposite side of the actuator cylinder) causing the actuator to shift position.

The resulting movement of the actuator shaft creates feedback through the feed back shaft /cam spring assembly.

The actuator stays in the position where the resulting force created by the change in the magnetic field of the permanent magnet is balanced by the feed back spring.

To further enhance the stability of the loop the compensation spring, which is connected, to the flapper counterweight receives direct feed back on the motion of the exhaust valve.

Series 56 4-20 mA Electro-Pneumatic Positioner



The input of a 4-20 mADC signal flows through an electric magnetic coil located in the magnetic field of a large permanent magnet.

The current variation of the 4-20 mADC signal varies the flux of the permanent magnet thus creating movement of the flapper in relation to the nozzle without any microchip circuitry.

The movement of the flapper (which is held in place by the plate spring acting as a pivot) then increases the distance in-between the flapper and the nozzle. The resulting changes in back pressure in the nozzle assembly causes the globe valves in the pilot valve assembly to shift position simultaneously.

The result being line 1 Output to the actuator has an (increase in air pressure filling the actuator cylinder), and line 2 Output has a (decrease in air pressure draining air from the opposite side of the actuator cylinder) causing the actuator to shift position.

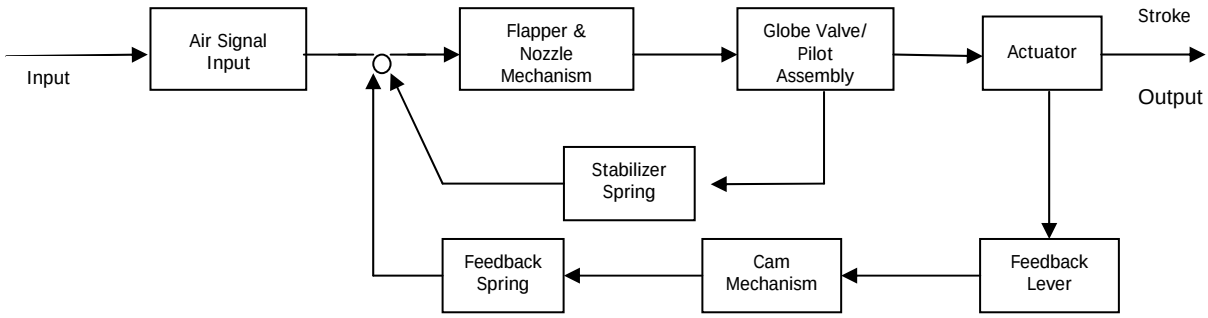
The resulting movement of the actuator shaft creates feedback through the feed back shaft /cam spring assembly.

The actuator stays in the position where the resulting force created by the change in the magnetic field of the permanent magnet is balanced by the feed back spring.

To further enhance the stability of the loop the compensation spring, which is connected, to the flapper counterweight receives direct feed back on the motion of the exhaust valve.

Series 55 3-15 psi Pneumatic Positioner

Flow Line Controls Series 55 Pneumatic positioners are the ideal choice for precise and repeatable performance in demanding and critical applications. Featuring a double globe valve / pilot assembly capable of moving large amounts of air with short positioning times. Utilization of double globe valves to control the actuator supply air in lieu of traditional spool valves lowers the air consumption by two thirds ensuring efficient and economical operation.



The pneumatic input signal acts on the input diaphragm creating movement on the flapper (which is held in place by the plate spring acting as a pivot) then increases the distance in-between the flapper and the nozzle.

The resulting changes in back pressure in the nozzle assembly causes the globe valves in the pilot valve assembly to shift position simultaneously.

The result being line 1 Output to the actuator has an (increase in air pressure filling the actuator cylinder), and line 2 Output has a (decrease in air pressure draining air from the opposite side of the actuator cylinder) causing the actuator to shift position.

The resulting movement of the actuator shaft creates feedback through the feed back shaft /cam spring assembly.

The actuator stays in the position where the resulting force created by the diaphragm is balanced by the feed back spring.

To further enhance the stability of the loop the compensation spring, which is connected, to the flapper counterweight receives direct feed back on the motion of the exhaust valve.

Specifications

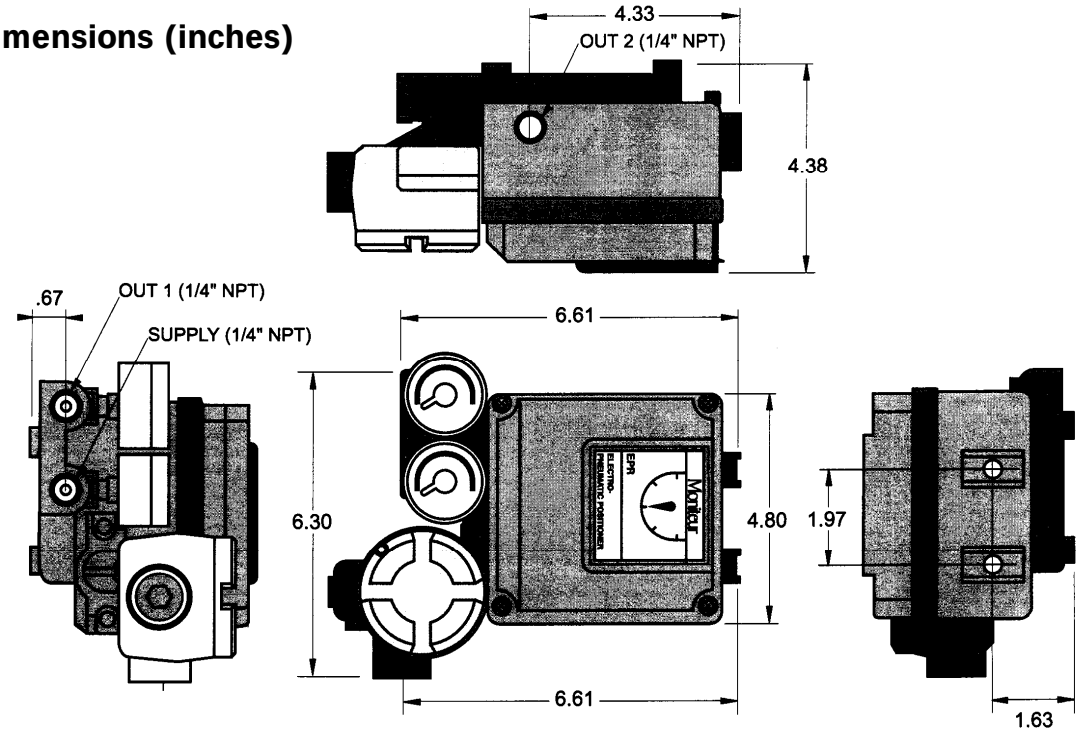
Series 55 3-15 psi Pneumatic

Input Signal	3 – 15 psig Split Range Available
Impedance	N/A
Stroke Range	0 - 90
Supply Range	20 to 100 PSIG
Air Delivery	7 SCFM
Air Consumption	0.26 SCFM
Operating Temperature	-4 to +158 F
Linearity	+/- 1%
Hysteresis	1% max.
Sensitivity	+/- 0.5%
Repeatability	+/- 0.5%
Pneumatic Connection	⅛ NPT – Gauge Ports ¼ NPT – Supply / Outlet
Enclosure	Design to NEMA 4, 4X
Enclosure Weight	Approx. 4.8 lbs.

Series 56 4-20 mA Pneumatic

Input Signal	4 – 20 mA @ 24 VDC Split Range Standard
Impedance	250 +/- 15 ohms
Stroke Range	0 - 90
Supply Range	20 to 100 PSIG
Air Delivery	7 SCFM
Air Consumption	0.15 SCFM
Operating Temperature	-4 to + 158 F
Linearity	+/- 1%
Hysteresis	1% max
Sensitivity	+/- 0.5 %
Repeatability	+/- 0.5 %
Pneumatic Connection	⅛ NPT – Gauge Ports ¼ NPT – Supply / Outlet
Enclosure	Designed to NEMA 4, 4X
Enclosure Weight	Approx. 6.5 lbs.

Dimensions (inches)



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